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isfactory, it is hoped that it will enable American workers to recognize the species and perhaps the forms given below. For other forms that are perhaps quite as likely to occur with us, the reader is referred to Dr. Wainio's Monograph.

CLADONIA PITYREA PHYLLOPHORA (Mudd.) Wainio Mon. Clad. Univ. 2: 355, 1894. Podetia cupless, only 10–30 mm. in length, more or less squamulose, corticate and without soredia. But Dr. Wainio admitted here one of our forms, more or less decorticate. Specimens collected at Emo, on the northern boundary of Minnesota and on Oak Island, in the Lake of the Woods, were placed here by Dr. Wainio. Elsewhere recognized only in Europe.

CLADONIA PITYREA SUBACUTA Wainio Mon. Clad. Univ. 2: 355, 1894. Podetia cupless, 10–35 mm. in length, wholly granulose, or verrucose or areolate-corticate toward the base, almost devoid of squamules.

A single specimen from Emo was placed here by Dr. Wainio. Not known elsewhere from North America. More or less common in Europe.

CLADONIA PITYREA CLADOMORPHA (Flk.) Wainio Mon. Clad. Univ. 2: 255, 1894. Podetia cup-bearing, the ranks quite short (about 12 mm.), granulose or sorediate, often verrucose or areolate-corticate toward the base, devoid or almost devoid of squamules.

The great similarity of the last two varieties or forms is apparent enough from the descriptions, and Dr. Wainio referred the cupless podetia of the collection from Emo to the last variety above, and those having cups to the present one. The taxonomic value of such forms may be doubted, but we record them, leaving the future to decide as to their value. A specimen collected in California by Dr. Given (1869) and sent to the writer as *Cladonia pyxidata* was referred to the present form by Dr. Wainio. Except for these two forms submitted to Dr. Wainio, not recognized in America. Several European exsiccata have been placed here.

Miami University, Oxford, Ohio.

NOTES ON RECENT LITERATURE II.

Notes on the Physiology of the Sporophyte of *Funaria* and *Mnium*.

A. J. GROUT.

(R. H. True in Beihefte Bot. Centralblatt 19¹: 34–44, 1905.)

This is an account of interesting experiments to discover the exciting cause of curvature of the seta in *Funaria hygrometrica* and *Mnium cuspidatum* Hedw. Dr. True concludes that "The young sporophyte, prior to the development of a distinct capsular rudiment, is either positively heliotropic or negatively geotropic, and tends to assume a perpendicular position which is fixed by the further development of the tissues. When in the young sporophyte the capsular rudiment has begun to develop, a sharp curvature appears just below the capsule, turning the capsular rudiment into the perpendicular position of either a positively geotropic or of a negatively heliotropic reaction."

Further experiments "seem to make it clear that in the case of *Mnium*,

and probably of *Funaria* also, the 'nodding' of the capsules is brought about by the stimulating action of gravity, since the direction of the illumination does not interfere with the tendency of the capsules to assume the 'nodding,' or in the case of *Mnium*, the pendulous position seen in nature." "The directive influence of illumination is clearly marked in determining the plane in which the capsular rudiment shall fall. Sometimes the apex of the capsule falls toward the light, sometimes from it."

"In an early growing stage the young sporophytes seem to react somewhat to gravity in a negative sense, tending to bend upward toward the perpendicular whether lighted from above or below."

The following were incidental observations in connection with the experiments. The entire zone of elongation of the sporophyte (in *Funaria*) is situated inside the calyptra. The zone of elongation is limited to a space within 2 mm. from the apex, the most rapid growth being found about 0.8 mm. from the tip. "The young seta was found to have reached its complete diameter at any given point as soon as its growth in length was completed."

The calyptra appears to serve a very important purpose in preventing the drying up of the young sporophyte tip. In *Funaria*, because of the more dry and exposed habitat of the species, it is only after the capsules are half grown that they are able to survive the drying out of a few days of hot dry weather. "Hence the season for sporophyte formation falls in the moist season of the year when the temperature is sufficient to allow rapid growth." In *Funaria* the young calyptra consists of a long beak-like distal portion, an enlarged sac-like portion contracted at base into a short collar-like portion which clasps the seta very tightly. Although this sac-like calyptra be removed with extreme care the sporophyte will not develop unless the capsules be half grown. Dr. True infers that this is due largely, if not entirely, to the drying out of the capsule after the removal of the calyptra. The cells of the calyptra have abundant chloroplasts, and Dr. True believes that it has powers of independent nutrition, but is somewhat in doubt as to the source of its water supply, which is apparently the minute quantity of water usually to be seen in the upper part of the calyptra during the earlier stages of sporophyte development. As *Mnium cuspidatum* grows in moist situations its calyptra can be, and is, spared much earlier. Brooklyn, N. Y.

DO YOU WANT YOUR POLYTRICHACEAE IDENTIFIED?

In the course of some work on the Polytrichaceae of western North America, to be published later, the writer has had occasion to attempt the elaboration of serviceable keys to the species of the family. To test these keys, and to get a wider acquaintance with the variations in the group the writer would be pleased to receive for determination, verification, or simply for examination, collections of Polytrichaceae, including the genera Catharina (Atrichum), Oligotrichum, Bartramiopsis, Polytrichadelphus, Pogonatum, Polytrichum.

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